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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/931,129	08/16/2001	Jae-Seung Yoon	678-726	3615

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EXAMINER

NGUYEN, DAVID Q

ART UNIT	PAPER NUMBER
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2681

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DATE MAILED: 05/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/931,129

Applicant(s)

YOON ET AL

Examiner

David Q Nguyen

Art Unit

2681

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 August 2001.
- 2a) ☐ This action is **FINAL**.
- 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 10-13 is/are rejected.
- 7) ☒ Claim(s) 9 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some * c) ☒ None of:
 - 1. ☒ Certified copies of the priority documents have been received.
 - 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 - a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ross et al (US 6426720) in view of Rauscher (US 6633762) and further in view of East (US 5400037).

Regarding claim 1, Ross et al disclose an antenna array apparatus of a base station in a communication system, the apparatus comprising: a position information generator for receiving the GPS position information of an aircraft (see col. 4, lines 36-40) and generating position information of the aircraft (see col. 4, lines 36-40 and fig. 1); an array signal processor for calculating a weight vector using the position information to form a transmission beam (see col. 3, line 63 to col. 4, line 51); and a beamformer, for forming the beam according to the weight vector in the direction of the mobile station through the beamformer (see col. 3, line 63 to col. 4, line 51). Ross et al do not mention the system having a mobile station that receives GPS (Global Positioning System) position information of the mobile station from satellites and outputs the GPS information representative of the absolute position of the mobile station; and outputting a transmission message to the antenna array by the transmission beam.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace a system having an aircraft with a system having a mobile station since examiner takes Official Notice of equivalence of the system having an aircraft and the system

having a mobile station for their use in the art and the selection of any of these known equivalents to form transmission/reception beam in a radio frequency communication link would be within the level of ordinary skill in the art.

Rauscher discloses a mobile communication system having a mobile station that receives GPS (Global Positioning System) position information of the mobile station from satellites and outputs the GPS information representative of the absolute position of the mobile station (see col. 6, lines 30-37). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the system of Ross et al with Rauscher's system in order to steering the antenna array in the direction of the mobile station accuracy in order to get good signal.

The system of Ross et al in view of Rauscher does not disclose outputting a transmission message to the antenna array by the transmission beam. However, East discloses outputting a transmission message to the antenna array by the transmission beam (see abstract and fig. 2). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide to provide the above teaching of East to the system of Ross et al in view of Rauscher in order to get good signal and improve signal quality.

Regarding claim 2, the system of Ross et al in view of Rauscher and further in view of East also discloses wherein the transmission beamformer forms transmission beams by generating as many transmission signals as M antenna devices by duplicating the transmission signal and multiplying each duplicated signal by a corresponding forward weight vector generated from the array signal processor, wherein M is a number of antenna devices (see abstract and fig. 2 of East).

Regarding claim 4, Ross et al disclose a reception antenna array apparatus of a base station in a communication system, the apparatus comprising: a position information generator for receiving the GPS position information of an aircraft (see col. 4, lines 36-40) and generating position information of the aircraft (see col. 4, lines 36-40 and fig. 1); an array signal processor for calculating a weight vector using the position information to form a transmission beam (see col. 3, line 63 to col. 4, line 51); and a reverse processor having a beamformer, for forming the reception beam according to the weight vector in the direction of the mobile station through the reception beamformer (see col. 3, line 63 to col. 4, line 51). Ross et al do not mention the system having a mobile station that receives GPS (Global Positioning System) position information of the mobile station from satellites and outputs the GPS information representative of the absolute position of the mobile station; and processing a message received through the antenna array by the reception beam.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace a system having an aircraft with a system having a mobile station since examiner takes Official Notice of equivalence of the system having an aircraft and the system having a mobile station for their use in the art and the selection of any of these known equivalents to form transmission/reception beam in a radio frequency communication link would be within the level of ordinary skill in the art.

Rauscher discloses a mobile communication system having a mobile station that receives GPS (Global Positioning System) position information of the mobile station from satellites and outputs the GPS information representative of the absolute position of the mobile station (see col. 6, lines 30-37). Therefore, it would have been obvious to one of ordinary skill in the art at

the time the invention was made to provide the system of Ross et al with Rauscher's system in order to steering the antenna array in the direction of the mobile station accuracy in order to get good signal.

The system of Ross et al in view of Rauscher does not disclose processing a message received through the antenna array by the reception beam. However, East discloses processing a message received through the antenna array by the reception beam (see abstract and fig. 2). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide to provide the above teaching of East to the system of Ross et al in view of Rauscher in order to get good signal and improve signal quality.

Regarding claim 5, the system of Ross et al in view of Rauscher and further in view of East also discloses the reception beamformer obtains a final array output signal by receiving signals through M antenna devices, multiplying each antenna device output signal by a corresponding reverse weight generated from the array signal processor, and summing the multiplied signals, wherein M is a number of antenna devices (see abstract and fig. 2 of East).

Regarding claim 3 and 6, the system of Ross et al in view of Rauscher and further in view of East also discloses wherein the weight vector is an optimum transmission array weight vector calculated by

$$W_{T/R} = k_{T/R} \alpha(\theta, \phi, \lambda_T)$$

where $W_{T/R}$ is the weight vector for the transmission/ reception array, $k_{T/R}$ is an arbitrary positive real number, and λ_T is the wavelength of the transmission/reception signal and θ is an elevation angle of the z axis by a position data the mobile station receives from the satellite and ϕ is an azimuth angle by a position data that the mobile station receives from the satellites (see col. 3,

line 63 to col. 4, line 51 of Ross et al).

2. Claims 7-8, 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ross et al (US 6426720) in view of Rauscher (US 6633762).

Regarding claims 7-8 and 11-12, Ross et al disclose an antenna array apparatus of a base station in a communication system and a beamforming method, the apparatus comprising: a position information generator for receiving the GPS position information of an aircraft (see col. 4, lines 36-40) and generating position information of the aircraft (see col. 4, lines 36-40 and fig. 1);

a relative coordinates calculator for calculating relative coordinates of the mobile station with respect to absolute coordinates of the base station from the position information (see col. 3, line 9 to col. 4, line 51); a position angle calculator for calculating a position angle of the mobile station with respect to the base station from the relative coordinates of the mobile station (see col. 3, line 9 to col. 4, line 51); a weight vector calculator for calculating a weight vector using the position angle of the mobile station to form a beam (see col. 3, line 9 to col. 4, line 51); and a beamformer for forming the beam according to the weight vector in an intended direction (see col. 3, line 9 to col. 4, line 51); a distance calculator for calculating a distance between the mobile station and the base station from the relative coordinates of the mobile station (see col. 3, line 9 to col. 4, line 51); a beam width controller for determining a transmission/reception beam width increment or decrement according to the distance between the mobile station and the base station (see col. 3, line 9 to col. 4, line 51).

Ross et al do not mention the system having a mobile station that receives GPS (Global Positioning System) position information of the mobile station from satellites and outputs the GPS information representative of the absolute position of the mobile station.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace a system having an aircraft with a system having a mobile station since examiner takes Official Notice of equivalence of the system having an aircraft and the system having a mobile station for their use in the art and the selection of any of these known equivalents to form transmission/reception beam in a radio frequency communication link would be within the level of ordinary skill in the art.

Rauscher discloses a mobile communication system having a mobile station that receives GPS (Global Positioning System) position information of the mobile station from satellites and outputs the GPS information representative of the absolute position of the mobile station (see col. 6, lines 30-37). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the system of Ross et al with Rauscher's system in order to steering the antenna array in the direction of the mobile station accuracy in order to get good signal.

Regarding claims 10 and 13, Ross et al disclose a beamforming method for an antenna array apparatus of a base station in a communication system, the apparatus comprising: a position information generator for receiving the GPS position information of an aircraft (see col. 4, lines 36-40) and generating position information of the aircraft (see col. 4, lines 36-40 and fig. 1); a weight vector storage for storing optimum weight vectors versus position coordinates within a predetermined base station area in the form of a table (see col. 3, lines 21-52); a

Art Unit: 2681

processor for selecting a weight vector corresponding to the position information of the mobile station or a weight vector most approximate to the weight vector corresponding to the position information from the table (see col. 3, line 63 to col. 4, line 51); detecting a weight vector most approximate to a weight vector corresponding to the position coordinates of the mobile station from the weight vector storage (see col. 3, line 63 to col. 4, line 51); and forming a beam according to the detected weight vector in an intended direction (see col. 3, line 63 to col. 4, line 51 and explanation in claim 1). Ross et al do not mention the system having a mobile station that receives GPS (Global Positioning System) position information of the mobile station from satellites and outputs the GPS information representative of the absolute position of the mobile station.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace a system having an aircraft with a system having a mobile station since examiner takes Official Notice of equivalence of the system having an aircraft and the system having a mobile station for their use in the art and the selection of any of these known equivalents to form transmission/reception beam in a radio frequency communication link would be within the level of ordinary skill in the art.

Rauscher discloses a mobile communication system having a mobile station that receives GPS (Global Positioning System) position information of the mobile station from satellites and outputs the GPS information representative of the absolute position of the mobile station (see col. 6, lines 30-37). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the system of Ross et al with Rauscher's system in

Art Unit: 2681

order to steering the antenna array in the direction of the mobile station accuracy in order to get good signal.

Allowable Subject Matter

3. Claim 9 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claim 9, the antenna array apparatus of Ross et al (US 6426720) in view of Rauscher does not disclose wherein a new weight vector w_{inc} is calculated to control the transmission/reception beam width according to the distance between the mobile station and the base station by the formula as specified in the claim 9.

Conclusion

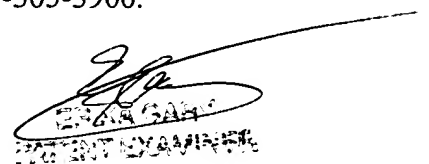
Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Q Nguyen whose telephone number is 703-605-4254. The examiner can normally be reached on 8:30AM-5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Erika A Gary can be reached on 703-308-0123. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

DN

David Nguyen



DAVID Q. NGUYEN
PATENT EXAMINER